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Strategy for Educating the Department of Defense Acquisition Work Force in Total Quality Management

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The purpose of this strategy is to provide broad guidelines for planning and coordinating a Total Quality Management (TQM) education and training program for the DoD acquisition work force. The strategy is organized around long-, mid-, and short-term goals. It also describes resources available to DoD training developers and managers who will subsequently be responsible for TQM education and training of their work force. Included in this strategy is a description of the educational requirements for a TQM awareness program directed at senior-level managers and general managers. A methodology for training development is also proposed.

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FOREWORD

This report describes a strategy for educating the Department of Defense (DoD) acquisition work force in Total Quality Management (TQM). TQM is a management philosophy that has been embraced by DoD as the best method by which to improve quality and productivity and to reduce costs. DoD has created a master plan for the implementation of TQM which includes long-, mid-, and short-term goals. The educational strategy described in this report identifies goals for educating and training the work force in TQM.

This effort was conducted under the project TQM Education Design for the DoD sponsored by the Office of the Assistant Secretary of Defense for Production and Logistics (TQM/IPQ). It is to be used as a guide for developing detailed implementation plans concerned with education and training.

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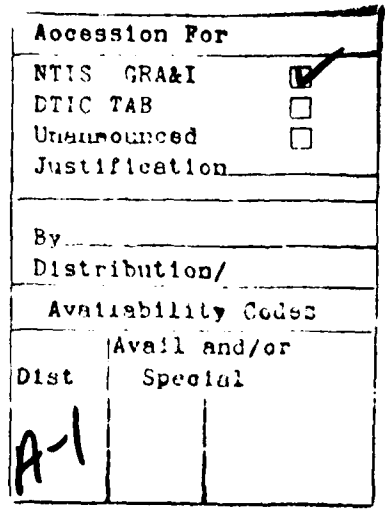

SUMMARY

PURPOSE

The purpose of this strategy is to provide broad guidelines for planning and coordinating a Total Quality Management (TQM) education and training program for the DoD acquisition work force.[1] The primary emphasis is on acquisition managers, although successful implementation of TQM will ultimately require educating and training of the entire work force. Part of the strategy is to capitalize on the TQM training resources (courses, instructors, etc.) already in existence within DoD. TQM capabilities which have been developed within the DoD logistics system can be transferred to the acquisition system, to be supplemented with resources external to DoD.

OBJECTIVES

This strategy has two objectives. The first is to describe the educational requirements for a TQM awareness program for managers that provides them with an overview of TQM principles and concepts. The second is to describe program goals, guidelines, and resources available to DoD training developers and managers who will subsequently be responsible for follow-on education and training of their subordinates.

BACKGROUND

The Office of the Secretary of Defense has created a master plan for the implementation of TQM in DoD. The initial focus of this implementation is the acquisition system. Central to this implementation is an integrated education and training program for the acquisition work force. Education in this context is that portion of the program concerned with the teaching of TQM principles and concepts. Training concerns the learning of skills and methodologies used in the application of TQM. The intent of this program is to institutionalize TQM within organizations through a continuing cycle of TQM education, training, and on-the-job applications.

The use of TQM began in DoD in the early 1980's in a few DoD logistic-type field activities. In 1987 its use began to rapidly expand with the advent of support from senior management. TQM is now one of the Department of Defense's primary initiatives. There is particular interest in seeing it applied to improve the acquisition system.

GOALS

Long-, mid-, and short-range goals have been developed which will contribute to the successful institutionalization of TQM in the DoD acquisition community.

Long-Range Goals:

The process of educating DoD acquisition personnel in TQM will be in place, with the majority of the work force trained. Acquisition personnel who deal with the top 20 defense contractors will receive extensive education and training in TQM. TQM will be integrated into ongoing DoD education programs, with training supplemented by outside public and private educational institutions.

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[1]Services will have responsibility for developing their own implementation plans.

Mid-Range Goals:

A critical mass of acquisition managers will be trained in TQM, with TQM integrated into ongoing acquisition curricula and into existing professional development channels. Acquisition managers responsible for specific weapons programs will receive extensive education.

The training program for TQM facilitators and statistical experts will be in place. Continuing education packages will be developed and distributed for broad use, with course developers concentrating on programs for specific applications. Those involved in design, delivery, and evaluation of education will use TQM methodology to facilitate their work and to ensure quality programs.

Short-Range Goals:

Following development of a TQM education and training strategy, other detailed plans will be developed that address training of course developers, facilitators, statistical specialists, and TQM coordinators. A survey will be conducted to assess TQM training resources available in both the public and private sectors. A DoD TQM resource center will be established and a survey conducted to assess TQM training resources in both the public and private sectors.

DISCUSSION

An effective TQM education and training program should cover (1) quality awareness and TQM philosophy, (2) action-oriented skills, which include use of statistical methods to analyze processes, (3) group development skills, such as team building, and (4) knowledge about changing organizational culture and overcoming barriers to implementing TQM.

Eventually the entire DoD acquisition work force must be trained. However, initial emphasis should be put on (1) personnel managing TQM implementation, (2) education developers and future facilitators and instructors of TQM, (3) senior and mid-managers, and (4) individuals responsible for coordinating TQM implementation and training within specific organizations.

Successful TQM implementation requires continuing education and training. Follow-on training needs to be tailored to specific jobs and organizations and should be determined after a needs analysis is conducted and objectives established. Needs analyses of the different subgroups (hierarchical and functional) will help to identify specific training requirements and optimal content and delivery methods. Special training courses for persons who will be assigned as TQM statisticians or coordinators for TQM efforts within organizations are needed.

In curriculum development, several issues should be considered, such as adapting materials to different learning styles and testing and evaluating prototype courses. These tasks should be assigned to education development specialists in the DoD schools or commands who have TQM expertise.

DoD must focus efforts on developing competent instructors to support an educational program in TQM. These instructors should have both TQM and training expertise as well as facilitation skills.

Delivery of TQM education should be provided within the current infrastructure as much as possible to keep costs down. Potential delivery sources for TQM education include DoD schools, other organizations within the federal government (DoD and other departments), state and local governments, academic institutions, and the private sector (e.g., consultants, learning institutes).

Developing a DoD resource center is also necessary for an effective education and training program. As part of the resource center, a case study data bank should be created to facilitate the dissemination of information gained from TQM implementation.

RECOMMENDATIONS[2]

1. Develop a management infrastructure for the TQM acquisition education and training program. Responsibilities will include reviewing and modifying this TQM education and training strategy and drafting specific action plans, identifying specific requirements for all TQM follow-on education and training, and coordinating inter- and intra-Service activities associated with training.

2. Identify issues related to funding TQM education and take programming and budgeting actions where necessary.

3. Educate course developers, instructors, evaluators, and facilitators.

4. Design awareness courses:
   - 1-day for senior management
   - 6-days for general management

5. Determine delivery agents and locations (e.g., schools).

6. Conduct awareness courses; modify, package, and distribute them.

7. Develop TQM follow-on training programs and programs designed to meet special needs of organizations.

8. Evaluate methodology for both individual courses and the overall TQM education program.

9. Establish a TQM resource center.

10. Integrate TQM education of DoD personnel and defense industry into public and private educational systems in addition to using government sources of education.

11. Integrate TQM education and training into the professional development of DoD employees.

12. Conduct research on the most effective and efficient means of educating senior management in TQM.

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[2] The Defense Acquisition Board will be responsible for determining which committees and/or boards will carry out these actions.

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I. PURPOSE

The purpose of this strategy is to provide broad guidelines for planning and coordinating a Total Quality Management (TQM) education and training program for the DoD acquisition work force. The primary emphasis is on acquisition managers, although successful implementation of TQM will ultimately require educating and training of the entire work force. Part of the strategy is to capitalize on the TQM training resources (courses, instructors, etc.) already in existence within DoD. TQM capabilities which have been developed within the DoD logistics system can be transferred to the acquisition system, to be supplemented with resources external to DoD.

This strategy has two objectives. The first is to describe the educational requirements for a TQM awareness program for managers that provides them with an overview of TQM principles and concepts. The second is to describe program goals, guidelines, and resources available to DoD training developers and managers who will subsequently be responsible for follow-on education and training of their subordinates.

II. BACKGROUND

A. Initial Efforts in TQM

Under the authority of Mr. Frank Carlucci, former Secretary of Defense, DoD, created a master plan for the implementation of TQM. By definition, TQM is the application of quantitative methods and human resources to assess and improve (1) the materials and services supplied to the organization, (2) all the significant processes within an organization, and (3) the degree to which the needs of the customer are met, now and in the future. For DoD, TQM is a strategy for continuously improving performance at every level to satisfy such broad goals as reducing cost, improving quality, and meeting schedule and mission needs.

Within this overall effort, Dr. Robert Costello, Under Secretary of Defense for Acquisition, and his staff have initiated an effort to implement TQM in the acquisition system. Dr. Costello states that two of his agenda items for improving defense acquisition are the use of TQM to (1) improve the effectiveness of the acquisition work force, and (2) improve product quality and reduce cost. Central to meeting these goals is the implementation of an integrated education and training program designed to instill TQM principles throughout the acquisition system.

TQM is not new to DoD. Initial TQM efforts stem back to the early 1980's in a few field activities. Since then, many more applications have begun. While most of these applications have involved logistics activities rather than acquisition ones, a considerable TQM experience base has been amassed. This includes people trained as instructors and facilitators as well as courses and programs available both internally and through consultants.

The Policy Guidance Council (PGC) has designated the Defense Systems Management College (DSMC) as leader in designing and implementing TQM education for the acquisition work force. The DSMC has developed three courses on TQM for acquisition managers--a one-day executive quality leadership course, a two-day management workshop for mid-management, and a five-day TQM methods course. These courses will provide valuable input for subsequent courses.

Awareness education of senior managers in the DoD has already begun. A 4-day Deming Seminar was conducted for over 400 senior DoD managers in May of 1988. A senior management TQM orientation attended by over 50 senior managers in DoD was conducted August 18, 1988. Possible future events include DoD quality and productivity conferences and an awareness seminar to be given to the heads of the DoD schools.

B. General Guidelines for an Effective TQM Education and Training Program

The implementation of a TQM education and training program should be highly flexible and tailored to particular organizational cultures. There is no blanket prescription for applying TQM to all organizations and situations. Moreover, the role of the Services must be recognized. The responsibility of the Secretary of Defense is to issue broad policy, but the Services and Defense agencies must decide on the details of their respective education and training programs.

Central to TQM implementation is the development of awareness about TQM principles and concepts. Commitment must be top-down. This means that senior management should participate actively in its implementation from the beginning. It is management's behavior that will establish the necessary organizational climate and will bring about the resulting commitment of the work force. Because of this unique role that managers will play as change agents, their training should include information on how to institutionalize TQM within their organizations.

Implementation of TQM and the education and training of the work force (both managers and subordinates) are inseparable processes. A comprehensive educational program includes a continuing cycle of TQM education, training, and on-the-job application. Education in this context refers to knowledge and conceptual learning; training refers to those skills and methodologies needed to implement TQM. In most cases, TQM education will involve some re-education, that is, changing current management practices, attitudes, and beliefs about quality, as well as ideas about managing people and organizations. All TQM education and training courses must include assignments to be performed back on the job. Those assignments will become the initial actions leading to implementation. Follow-on education is necessary as a vehicle for feedback as well as for obtaining new information.

An effective TQM education and training program should cover (1) quality awareness and TQM philosophy, (2) action-oriented skills, which include statistical methods to analyze process, (3) group development skills, such as team building, and (4) knowledge about changing organizational culture and overcoming barriers to implementing TQM.

An awareness of TQM philosophy is central to TQM implementation. The development of quality awareness requires that the cultural climate and the attitudes of the entire work force be "quality first," particularly in terms of processes. Securing this mind set requires an understanding of the processes in which one is involved. This, in turn, involves both systems thinking and statistical thinking. Systems thinking demands that individuals have a view of their organization that includes processes and people, from supplier to customer. Statistical thinking involves a realization that all processes have a natural variation and an understanding of the implications of reducing variation to improve the process. Education for quality awareness should also include guidance in the development of an organizational philosophy of TQM. It is this philosophy that will guide managers in formulating new organizational goals.

One issue that seems to be misunderstood by many people is the relationship of the statistical tools to the broad concept of TQM. Some individuals and organizations appear to focus primarily, if not exclusively, on these tools. Research conducted on implementation of TQM has shown that an emphasis on teaching and applying the statistical tools without a management commitment to quality decreases the probability of success. Ideally, training should be provided "just-in-time" to give people the skills they need as they start using TQM methods. (A list of tools and methods along with general topics addressing quality improvement is provided in Appendix A.)

Within a TQM environment, teamwork is a necessary condition for putting action-oriented skills to work. Trust, communication, and cooperation are necessary for effective team functioning. Training for effective communication not only includes an awareness of one's feelings and reactions and how they color speaking and perception, but an awareness of others' points of view. Therefore, group development skills such as team building and effective communication should be integrated into the education and training program.

The TQM approach also emphasizes the major role that managers have in achieving quality improvements through the use of a process analysis, control, and improvement approach known as the "Plan-Do-Check-Act" cycle (PDCA) developed by Walter Shewhart (Deming, 1986). Many technical professionals may recognize the concepts of the PDCA cycle as those of the scientific approach to problem solving.

In an effort to assist managers to understand the specific activities in the PDCA cycle, a process improvement model was developed at the Navy Personnel Research and Development Center (Houston & Dockstader, 1988). This model outlines the major tasks involved in improving quality through the PDCA cycle. During the "Plan" phase, management must identify the organizational goals and the processes involved in achieving the goals. Activities in the "Do" and "Check" phases involve the operation of the processes and the analysis of process variables. During the "Act" phase of the cycle, process corrections and improvements are made and evaluated.

Within DoD, top management is a relatively unstable part of the work force. There is a high rate of turnover in these jobs due to (1) changes in political appointees, (2) routine changes in tours of duty for military and senior civilians, and (3) reorganizations. While it is important that this mobile sector of the work force be at the heart of the TQM educational effort, it is equally important to identify and train those other senior managers whose positions are more stable. Targeting those within the work force who have the greatest influence on others is also essential. It is important that such individuals be selected for initial training, and that they represent a cross-section of the entire work force.

TQM involves both supplier and customer, and they should be considered in the education and training plan. This can be accomplished by having vendor and customer quality seminars and/or by including representatives of these constituencies in the education and training of the DoD acquisition work force. Another method is to share resource materials and course curricula.

There are limited resources available for education and training. The costs for developing and administering courses and for the training and paying of instructors will be highest during the first few years. With a constrained budget, a strategy is needed for using available resources, which may involve coordination efforts within all of DoD as well as with other branches of government and the private sector.

There are two ways to develop and deliver TQM education. The first is to create new mechanisms, such as new courses, schools or institutes, or career paths. The second is to use existing mechanisms and to modify them. DoD has a vast infrastructure of courses, schools and training facilities and career paths which can be used to develop and deliver training. In general, the existing infrastructure should be considered first in the interest of cost-effectiveness. Only when the existing mechanisms don't suffice should new ones be created.

III. GOALS

Education and training goals were developed that reflect the overall DoD goals for implementing and sustaining TQM. Figure 1 shows long-range goals. These goals address the cultural changes that represent the mature application of TQM. Figure 2 shows the mid-range goals that specify targets and desired achievements. Figure 3 shows short-range goals that set the tone and direction for the mid-range goals. One of the most important short-term goals is to conduct a survey of what training and education resources are already available, both inside and outside DoD, to avoid duplication.

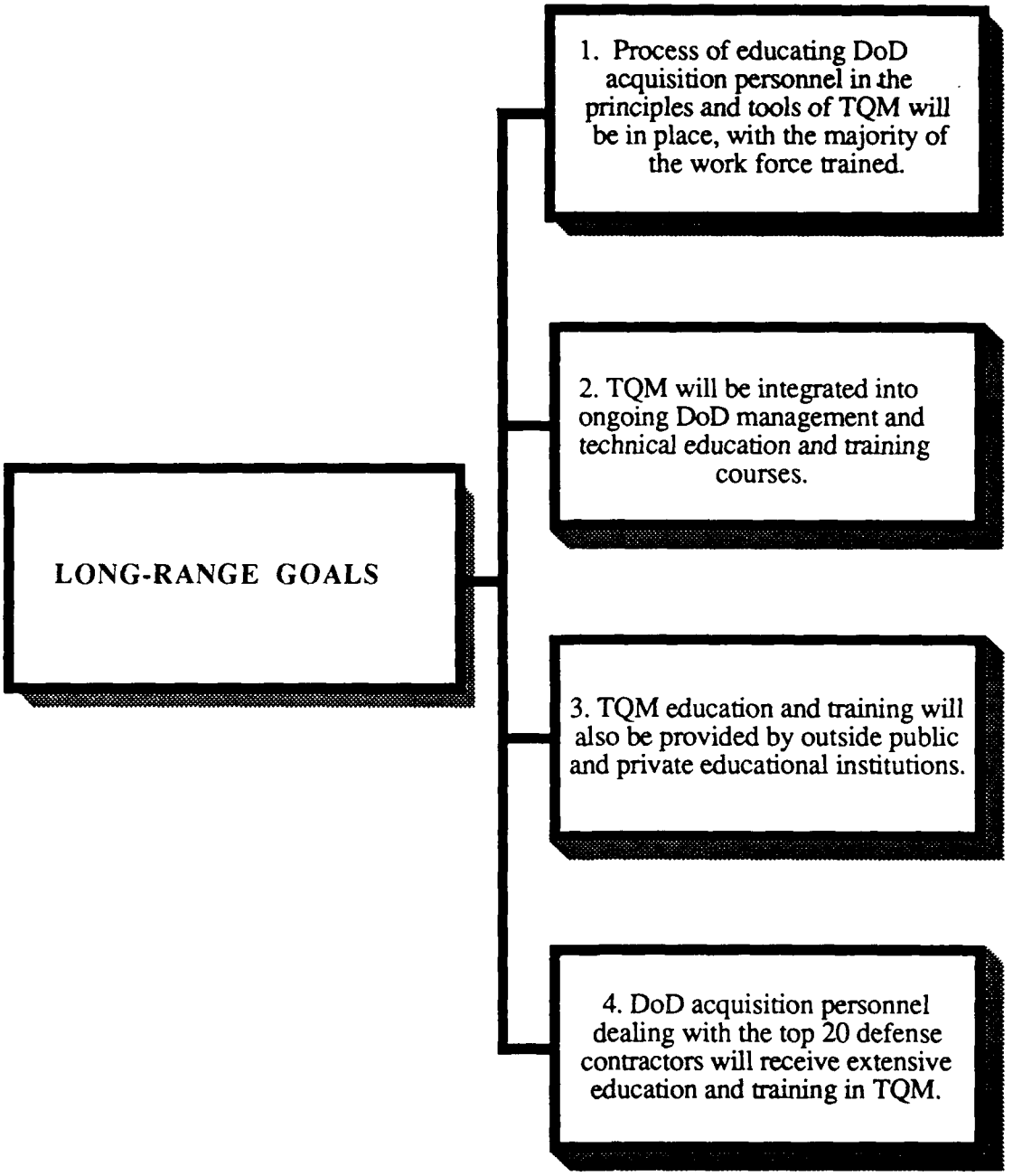


Figure 1. Long-range goals.

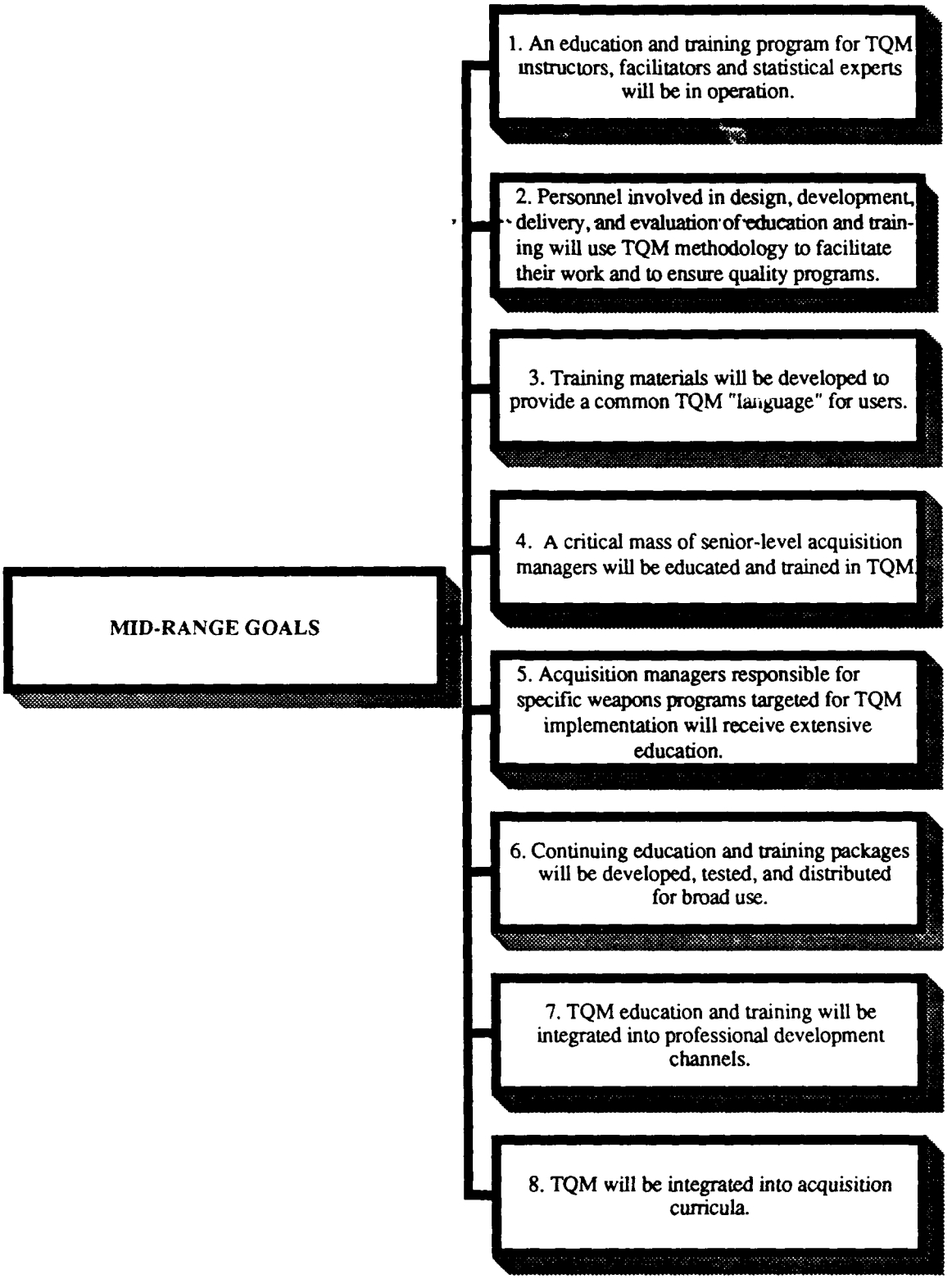


Figure 2. Mid-range goals.

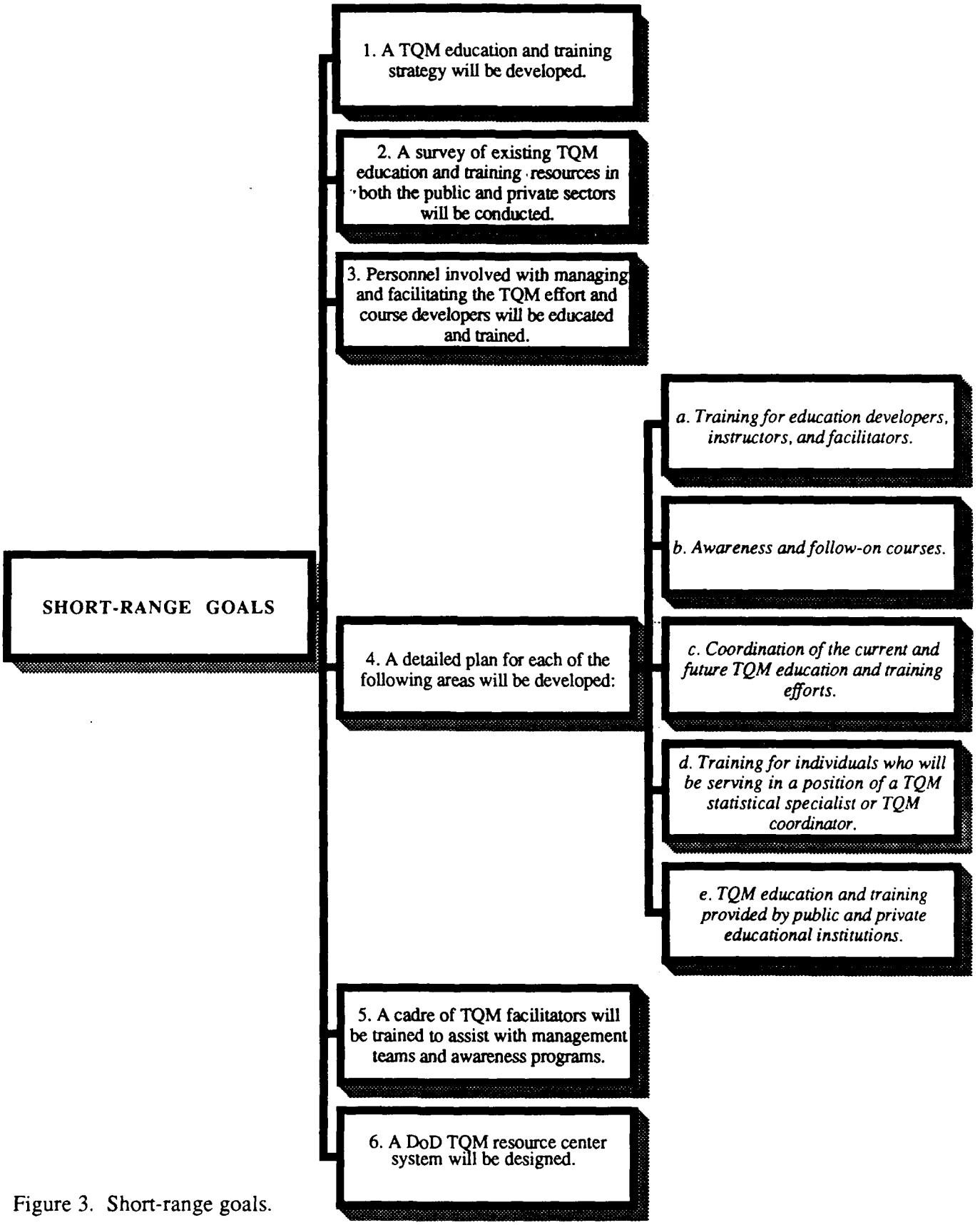


Figure 3. Short-range goals.

IV. MANAGEMENT INFRASTRUCTURE FOR TQM EDUCATION AND TRAINING PROGRAM

The Defense Acquisition Board (DAB) has been given the initial charter for providing top management guidance for TQM implementation in the acquisition system. As such, it functions as the Executive Steering Committee (ESC) for the acquisition system. Under the DAB should be a DoD Quality Management Board for Education and Training (QMBE&T). In addition, each of the Services should consider forming their own QMBE&Ts to plan and implement similar education programs.

The DoD QMBE&T should consist of members of the OSD staff, a representative from each Service QMBE&T, educational representatives from the major defense agencies, and representatives from the DSMC and the primary developers and providers of education and training (see Figure 4). Inter-Service coordination will be achieved by creating a "linking pin" structure (e.g., having one representative from each of the Service QMBE&Ts serve on the DoD QMBE&T).

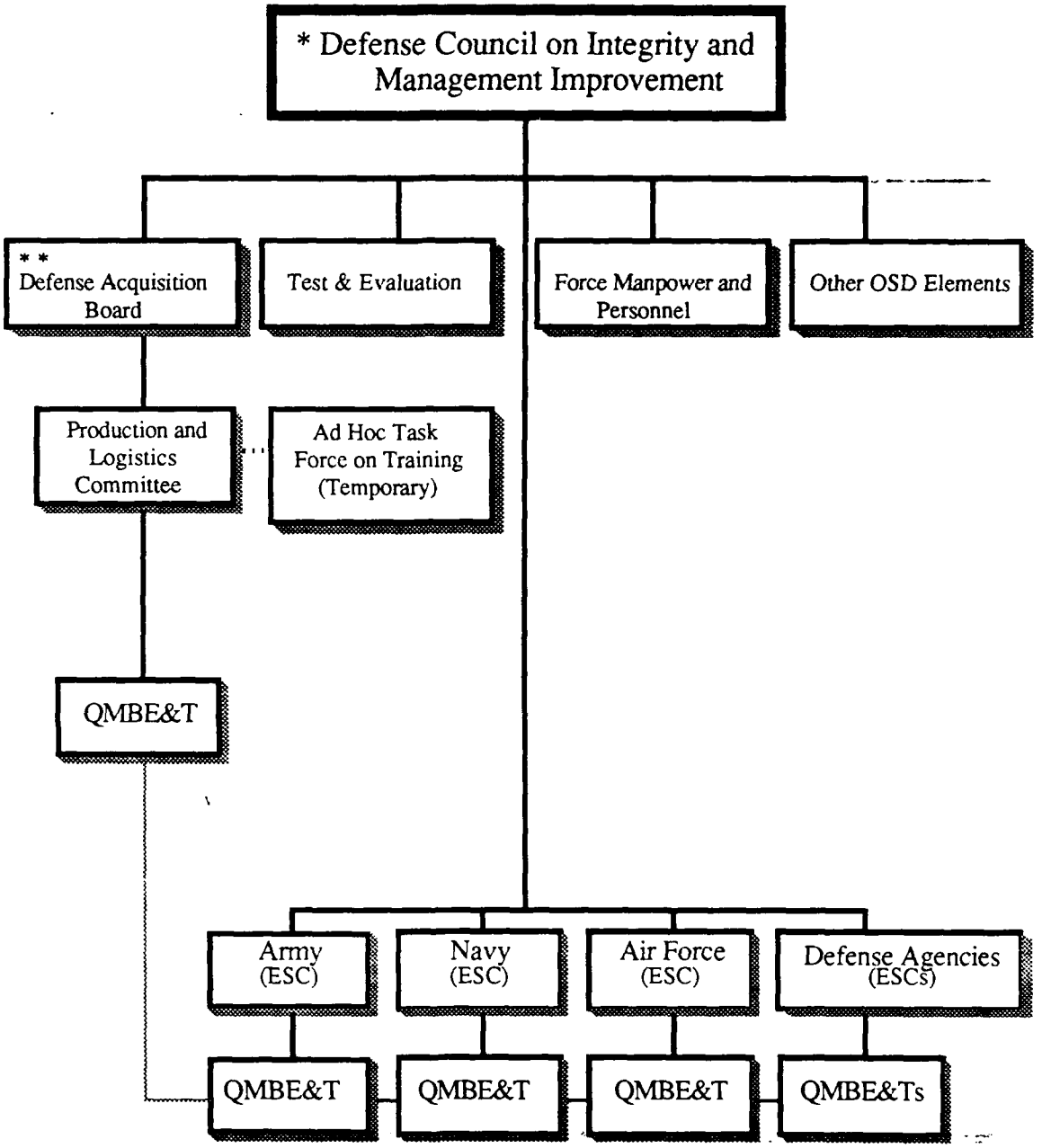
The DoD QMBE&T will provide policy and guidelines and serve as a coordinating body. The individual Services will be responsible for specific planning and implementation. The number of additional staff/support personnel required to assist the QMBs must be determined. Initially, the DAB, QMBs, and staff personnel should consider use of experts/consultants from DoD and the private sector to provide guidance. These experts, once identified, should serve as facilitators and also educate and train TQM management personnel.

V. PROPOSED MANAGEMENT AWARENESS COURSES

A one-day senior management course and a two-part, six-day general management course are recommended for awareness education. Examples of TQM awareness courses are provided in Appendices B and C. Although the one-day course will be a vehicle for reaching senior managers, the six-day course will be strongly recommended for all managers. The one-day course will provide senior managers with a brief overview of TQM, a definition of their role in TQM, and some action items, including the need for follow-on education of themselves and their subordinates. A brief discussion of issues relating to the education of senior managers in the DoD is provided in Appendix D.

The six-day course will be applicable to all managers although the initial participants should be senior managers. The six-day course can be taken without attending the one-day course. The course will be divided into two three-day sessions. The interval between sessions will be called the "back to work" period. The purpose of the split course is to provide opportunities for application of TQM principles to "real world" settings. The focus of the six-day course will be to provide managers with experiential activities covering the four major areas of concern in educating and training their work forces in TQM: (1) quality awareness and TQM philosophy, (2) action-oriented skills, (3) group development skills, and (4) knowledge about changing organizational culture and overcoming barriers to implementing TQM. In addition, a TQM implementation methodology, such as the process improvement model, should be presented.

An important question must be answered prior to the development and administration of awareness education. To what extent does DoD wish to encourage its acquisition managers to learn how to practice TQM internally on their own processes prior to having them learn how to administer TQM with respect to suppliers/contractors? A determination on this issue will have a major effect on the subject matter of the educational program. Experience both in industry and DoD field activities indicates that the full implications of TQM are only grasped by applying it to one's own processes. In other words, there is a danger in asking managers to try to monitor TQM activity in a contractor operation or product when those managers have no personal implementation experience. A second danger is that the DoD acquisition community could eventually be accused by the defense industry of not being willing to practice what it preaches. This issue is a very complex one. It is raised as an "open issue" in this strategy because it will have a large impact on the education program.



* Defense Council on Integrity and Management Improvement (DCIMI) is the ESC for all of DoD.

* * Defense Acquisition Board (DAB) is the ESC for the acquisition system.

Figure 4. Quality Management Board for Education and Training (QMBE&T).

VI. PROGRAM DESIGN AND DEVELOPMENT

A. Population

1. Who Should be Trained?

Although successful TQM implementation involves education and training of the entire work force, the emphasis of this strategy is on acquisition managers. The population addressed in this plan includes (1) personnel managing the TQM implementation, (2) course developers and future facilitators and instructors of TQM, (3) senior and mid-managers, and (4) those responsible for TQM implementation and training within specific organizations. Managers within this population who can provide guidance on who should be trained need to be identified. A list of job categories within the acquisition community is provided in Appendix E.

While the designated population for this strategy is made up of DoD acquisition managers, consideration should also be given to facilitating TQM education of people outside the DoD who heavily influence the acquisition process. This would include members of Congress who serve on the Armed Services and Appropriation Committees and their staffs.

2. Where are They Currently Located?

A fair number of management personnel targeted for training are located in DoD headquarters activities in the Washington, D.C. area. However, many others are located across the country and around the world. An analysis of these locations must be performed to identify optimal training facilities.

3. In What Order Should They be Trained?

The first people to be trained should be those responsible for managing and implementing the TQM effort (e.g., the DAB and QMB members). The second group should be those developing, delivering, and evaluating education (e.g., curriculum developers, facilitators, and instructors). For the remainder of the acquisition work force, training should reflect a top-down approach, at the same time providing education to selected segments of the acquisition community. Most DoD organizations are too large to educate all personnel during the initial phase of training. By selecting prototype groups, it will be possible to provide more comprehensive education and to assess progress. Case studies can be developed from these initial "pilot" programs.

All acquisition managers who work on a major weapons system (or class of smaller systems) should receive the core education in cross-functional groups, which include program management, procurement, legal, financial, logistics, manpower, engineering, T&E, etc. One reason is that all major acquisition processes flow across one or more of these functional areas. Continuous improvement will, therefore, require a cross-functional team effort in which all members have the same basic education. Another reason is that members from all these functions play a role in writing and monitoring contracts and will ultimately be involved in evaluating contractor TQM activity. Unless they all have been exposed to the same basic information, they are likely to convey somewhat differing expectations (among themselves) to contractors or will have trouble reaching agreement among themselves on a unified position.

Determination of which managers should be trained first must be made. The initial thrust of the education should be directed toward those managers responsible for large acquisition programs or contracting facilities, particularly those who deal with the top 20 contractors. These include program executive officers (PEOs) and major program and project managers, particularly Materiel Professionals. Some of the initial organizations to receive TQM education should be the systems

command headquarters, NAVPROs, AFPROs, and ARPROs, DLA Headquarters, and major field activities such as DCASRs as well as field contracting organizations.

It should be the task of senior management to determine who in their organization, in addition to themselves, should receive education first. A survey to assess the readiness of organization units may be useful in determining where training should be initiated. TQM education should be initiated in those organizational units where it is most likely to succeed. Building an initial set of "success stories" in the acquisition arena would provide models for other activities as well as input for case studies and networking materials. It is possible to predict potential success. Factors to consider include (1) top management motivation and commitment, (2) the stability of senior management in terms of providing continuity of education and training, (3) capabilities for follow-on training, (4) the influence and span of authority of leaders to ensure program continuity and momentum, and (5) previous history of coordination and cooperation with other organizations.

B. Student Learning Styles and Instructional Methods

In curriculum development, several issues should be considered, such as adapting materials to different learning styles and testing and evaluating prototype courses. A discussion of student learning styles and instructional methods for TQM education is provided in Appendix F. Development and distribution of course materials including pre-class readings, in-class handouts, and post-class materials are discussed in Appendix G. The development of TQM implementation case studies in acquisition functions is recommended.

C. Curriculum Modules

A modular course format is recommended for the six-day course as well as for all follow-on courses. This allows for re-organizing the format and selecting content areas most relevant for a particular population.

D. Prototype Courses: Test, Review, Evaluate

Once the model programs have been developed, they must be tested. Evaluation should be based on predetermined criteria and a feedback process. Based on the results of the evaluation, programs may be modified. Once the courses are completed, they should be packaged for distribution. Potential users of educational packages include DoD schools, training facilities and resource centers, contractors, and the defense industry to use in developing their own courses. This sharing would help ensure compatibility between DoD and defense industry education.

E. Certification Process and Criteria

Courses will be developed by more than one source. In order to ensure quality, a certification process and criteria should be developed. This should be done by the same organization responsible for developing course objectives. The certification process will be used in developing and evaluating contractor proposals as well as certifying school programs. The Curriculum Advisory Council (CAC) of the Acquisition Enhancement (ACE) program could be tasked with this responsibility. ACE has overall responsibility for certification in the area of DoD-mandated acquisition education.

F. Prerequisites, Waivers, and Equivalencies

Prerequisites, waiver requirements, and course equivalencies must be identified to integrate prior training and ensure coordination across different schools and activities. This task should be performed by the same organization responsible for certification. Again, the ACE program might be the most logical choice to perform this task.

VII. DELIVERY ISSUES

A. TQM Instructors

DoD must focus efforts on developing instructors with background in both TQM and training expertise. One approach to this problem would be to develop a special TQM instructor training program.

Instructors for the on-site courses should be selected from personnel with successful experience in the application of TQM principles. Initially much of this staff will be made up of people in DoD who already have considerable experience and knowledge in TQM. A fair number of such people are affiliated with DoD field activities. Outside contractors should be used to supplement their efforts. As more DoD components gain useful TQM experience and learning, a pool of uniformed and civilian expert practitioners and trainers should emerge.

Education in TQM should include technical information as well as group development skills such as team building, effective communication, and group problem solving. It is important that the instructors integrate courses concerned with interpersonal skills with information about TQM philosophy and practices. There are currently programs offered in the private and public sectors covering these skills, but if off-the-shelf courses are used, they should be taught in a way that directly applies to TQM. Experience in how to integrate interpersonal skills training with technical training and TQM implementation is lacking and needs to be addressed by the research community.

B. Delivery Agents of TQM Education

Delivery of TQM education should be provided within the current infrastructure as much as possible to keep costs down. Potential delivery sources for TQM education fall into four categories (see Figure 5). The first represents organizations internal to DoD, such as DoD schools; the second consists of organizations within the federal government, but outside the DoD; the third is made up of state and local government and academic institutions; and the fourth is the private sector. The delivery sources discussed in this plan by no means represent an exhaustive list.

1. Delivery Agents Internal to DoD

a. DoD Schools

The DSMC has been designated as the lead activity for TQM acquisition education. All DoD schools (including the DSMC), senior service schools (such as the Industrial College of the Armed Forces), and technical schools will serve as the primary delivery agents for TQM acquisition education. Although tasked with coordinating the TQM education and training program, DSMC itself does not handle large numbers of students. To accomplish this task of educating large numbers of people, other educational sources need to be identified and utilized, all of it coordinated by the DSMC and ACE. Currently, there are no DoD schools that have comprehensive TQM programs, but many offer some subset of courses (usually statistical), and most are willing to expand their curricula to include TQM. A list of DoD schools to be used as potential education and training sites is provided in Appendix H along with a brief discussion of their current and future TQM involvement.

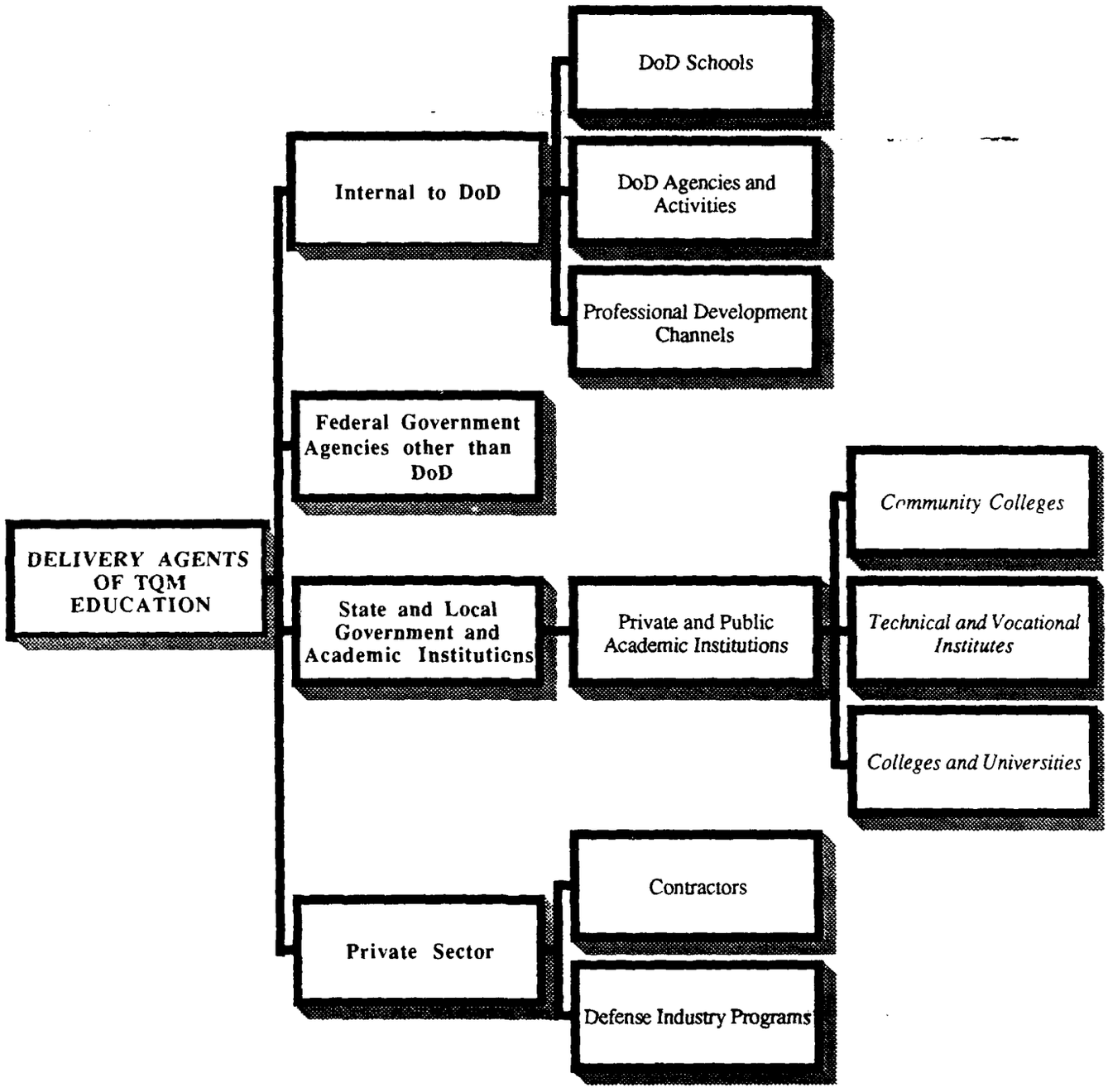


Figure 5. Delivery agents of TQM education.

b. DoD Agencies and Activities

Many systems commands have their own management development programs and courses. Organizations such as the NAVAIR Executive Institute, NAVSEA Professional Development Center, and the Federal Executive Institute may also provide TQM education and training. There are other educational programs which offer TQM-related courses, such as a productivity and quality awareness course under development and the "Transition from Development to Production" course, both under the auspices of the Assistant Secretary of the Navy (S&L).

c. Professional Development Channels

DoD already has many professional career development activities that either offer courses or determine course requirements for specific jobs and career tracks. These programs typically lay out a plan for education and training integrated with career assignments. TQM education should be integrated into those channels.

Formal career development programs for civilians exist in many different areas of acquisition, such as logistics, procurement, and quality assurance. Moreover, the Navy recently began a Civilian Materiel Professional Program. There are also many military career fields in the acquisition community such as the Supply Corps. All the services have begun to develop special programs for senior officers in materiel acquisition or management, such as the Air Force Acquisition Management Program, the Army Materiel Acquisition Management Program, and the Navy Materiel Professional Program. It is important to involve these communities in integrating TQM education into these career paths as soon as possible.

The Acquisition Enhancement (ACE) Program Office, located at the Defense Systems Management College, could play a significant role in integrating TQM into professional development channels. It has broad responsibilities to coordinate educational and funding requirements and course offerings across DoD for acquisition personnel. It could assist, for example, in inserting TQM educational requirements into the developmental requirements for the various career areas in the acquisition work force.

d. Additional Sources of Education

There are additional sources of educational programs. Although these other sources may not be suitable for the presentation of awareness courses, they might be useful vehicles for follow-on, special, or more technical courses, and useful for getting information to government personnel (military or civilian) who work outside of the normal chains (e.g., reservists, people on extended TDY overseas). These additional sources include:

- Service school correspondence course programs.
- Accredited off-campus instruction programs (e.g., Army Logistics Management Center [ALMC]).
- Learning resource centers (e.g., ALMC Resource Center).

2. Non-DoD Government Sources of Education

TQM awareness programs are currently being developed/offered by agencies within the federal government, but outside of DoD. Some of these are available to DoD personnel, such as the Executive Overview of TQM course offered by the newly established Federal Quality Institute (FQI).

3. State and Local Government and Academic Institutions

Public and private schools and technical institutes may be providers of free or relatively inexpensive education. It would be desirable to eventually have all educational institutions (e.g.,

universities, colleges, community colleges, and vocational institutes) integrate TQM into their academic programs. This would mean that personnel entering government positions would already be educated in TQM. As an initial effort, community colleges and vocational institutes can be requested to provide TQM education and training. Current (non-government) efforts are underway in California and many other states to provide TQM education within the community college system.

4. Private Sector

a. Contractors

Due to the shortage of TQM expertise (particularly instructors) within DoD, external sources will need to be used to supplement internal sources during the initial phase of education. Numerous contractors are developing and offering TQM courses. It is desirable to have some sort of certification process or method of identifying those qualified. One method for ensuring quality contractors is to have a resource center provide names of those contractors determined by DoD experts to meet qualifications. Another method is to have a master contract with several approved/certified contractors, easily accessible using government work order requests. This would avoid the lengthy and complex contracting process. This is the method being used by the FQI.

b. Defense Industry Programs

One of the goals of TQM is to develop cooperative and mutually beneficial relationships between the supplier and the customer (in this case, defense industry). Many of the major defense contractors are already developing in-house TQM programs. Some contractual agreement could be reached between government and the contractors to permit personnel from both groups to jointly attend education and training programs. The exchange of course curricula and resource materials between government and industry is also recommended.

VIII. EDUCATIONAL SUPPORT

A. Resource Center

A DoD resource center is a desirable adjunct for an effective education and training program. To maintain cost-effectiveness, it is essential to minimize redundancy in the development of courses and materials. A clearinghouse with computer search facilities and experienced consultants would enable training developers to select existing modules to use in their own programs and would provide support during all phases of the implementation.

As part of the resource center, a case study data bank should be developed to disseminate information gained from TQM implementation. Information from this data bank could provide models for TQM implementation. Computer access to this data bank could be made available from resource centers in addition to traditional DoD information networks and bulletin boards. An on-line TQM applications journal updated every month or quarter could provide generic application packages for practitioners and trainers.

Factors to consider in designing a resource center include location, accessibility, management staffing, and material requirements. Placing a TQM acquisition resource center in an existing facility such as the DSMC may be one approach.

B. Additional Sources

Additional educational support may be solicited through the unions, professional associations, and media sources such as federal or military newspapers. Support could be in the form of a resource center outside DoD, the sponsoring of TQM programs, conferences, or the provision of networks for dissemination of information.

IX. EVALUATION OF THE PROGRAM

The effectiveness of the educational programs needs to be evaluated. There are three stages of educational evaluation. The first is to determine the extent to which the information provided in the course was learned (Dick & Carey, 1985). This can be done using a test or assessment instrument. The second stage involves determining if, and to what degree, the information has been appropriately applied at the workplace (Tuckman, 1979). This type of evaluation is usually conducted one to three months after completion of the training. The third stage involves measuring the effect on the organization, and is usually conducted six months to one year after training and possibly thereafter on an intermittent basis (Cohen, Hall, & Cohodes, 1985; Morris & Fitz-Gibbon, 1978).

It is the responsibility of each school to evaluate whether the students attending their courses met the stated learning objectives. Determining whether the new knowledge has been applied and measuring the effect of that application on the organization will require on-site evaluation.

X. TQM CONTINUING EDUCATION AND SPECIAL COURSES

TQM implementation requires continuing education and training. The awareness courses described in this report offer just that: awareness. A detailed strategy for developing follow-on programs should be developed. Follow-on training should be tailored to specific jobs and organizations. This involves conducting front-end analyses of the different subgroups (hierarchical and functional) to identify specific training requirements and optimal content and delivery methods. A recommended method for design and development of instruction is shown in Appendix I.

The levels of expertise will vary among employees. For example, engineers will need training in advanced statistical methods, while secretaries may only need to know how to use the seven basic statistical tools. Levels and categories of proficiency will need to be determined. A certification process could be established based on level of proficiency achieved. Organizing training in this way could assist professional development and training specialists in determining requirements and needed resources for long-term planning.

Courses are needed for persons assigned by their organizations to function as TQM statisticians or coordinators. These two functions are necessary for TQM implementation, although they can be carried out by a single individual. Development of these courses should be completed within one year and include ongoing sessions to allow participants to review and solve problems, share experiences with other facilitators, obtain new and updated information, and perform as instructors for new facilitators. Since TQM involves continuous improvement, continual updating of information and skills is important.

Training and indoctrination of new people must also be addressed. Employees in transition (civilian and military) and new employees will need to be indoctrinated. Since these people will enter their new jobs one at a time, organizations need to have an orientation and follow-on training for these people. If an awareness program exists in a nearby location, new employees could be sent at minimal cost. In-house indoctrination courses given periodically or use of video tutorials or interactive video may be the preferred means.

XI. FUNDING

Educational funding should be an item on the early agendas of the various ESCs at OSD, the defense agencies, and Services. Several topics related to short- and long-term funding must be addressed. They include:

- Research, design, and development costs (personnel, materials, time).
- Delivery costs (instructors, facilities, materials, time).

- Sources of funding.
- Distribution of funds (competing needs within and between organizations).
- Requirement for TQM compared with requirements for other current education and training.
- Accounting and evaluation systems.

XII. RECOMMENDATIONS

1. Develop management infrastructure for TQM education and training program.
    - The DAB will establish an education and training QMB which will include DoD education and training specialists, managers, and TQM experts.
    - The QMB members will receive ongoing TQM education by a facilitator/instructor working with the board.
    - The QMB will review and modify the TQM education and training strategy and begin drafting action plans.
    - The QMB will be responsible for identifying requirements for all TQM education and training. Government TQM experts (contractor, if necessary) will be appointed or hired.
2. Identify issues related to funding TQM education and take programming and budgeting actions where necessary.
3. Educate course developers, instructors, evaluators, and facilitators.
    - Initial education will use existing awareness and training programs (e.g., those available through Navy Personnel Research and Development Center, consultants, DSMC).
4. Design awareness courses.
    - 1-day for senior management.
    - 6-days for general management, tailoring modules for different hierarchical functional groups.
5. Determine delivery agents and locations, with lead school (DSMC) coordinating effort.
6. Conduct awareness courses; modify, package, and distribute them.
7. Develop TQM follow-on training programs designed to meet special needs of organizations.
8. Evaluate methodology for both individual courses and the overall TQM education program.
9. Establish a TQM resource center for distributing educational materials.
10. Integrate TQM education of DoD personnel and defense industry into public and private educational systems in addition to using government sources of education.
11. Integrate TQM education and training into the professional development of DoD employees.
12. Conduct research on how best to educate senior management in TQM.

XIII. ADDITIONAL ISSUES

A. Integration of TQM into all of DoD

Application to non-acquisition DoD areas should be addressed. Although there are general TQM concepts that apply across all jobs, there are also differences in how the principles and tools are applied. There should be research conducted on how to implement TQM in areas different from traditional "product and service" organizations where TQM has primarily been applied.

B. Senior Management Education

There should be a specific focus on senior management education. Minimal research has been conducted on how to educate top-level managers in either the public or private sector. These people seldom receive continuing education or training. They usually have a great deal of education and experience in management, some of which may not be compatible with TQM. Since educating senior managers and gaining their commitment are the keys to successful implementation of TQM, it is important that educational methods tailored to their needs be developed.

XIV. SUMMARY

Actions leading to TQM transformation are emerging in DoD. A necessary ingredient for success is a quality education and training program that is continuously improving to meet the needs of acquisition managers. The strategy for that program has been described in this report. The next goal should be to translate this strategy into action, develop test models (prototypes), begin implementation, evaluate the process, and, in the TQM mode, continue to improve upon it.

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APPENDIX A

TQM TOOLS AND METHODS/TOPICS

APPENDIX A
TQM TOOLS AND METHODS/TOPICS

I. Management Perspective.

- A. Cost of quality.
- B. TQM concepts and quality principles.
- C. Responsibilities.
  1. Management practices to support TQM.
  2. Organizational TQM structures.
  3. Policy deployment.
  4. Customer satisfaction.
  5. Customer-supplier interface.
- D. Implementation process/guidelines.

II. Basic Methods.

- A. Seven tools.
  1. Pareto chart.
  2. Cause-and-effect (fishbone) diagram.
  3. Flow chart.
  4. Run chart.
  5. Histogram.
  6. Scatter diagram.
  7. Control charts.
- B. Seven new tools for management and planning.
  1. Affinity chart.
  2. Interrelationship digraph.
  3. Tree diagram.
  4. Matrix chart.
  5. Matrix data analysis.
  6. Process decision program chart.
  7. Arrow diagram.
- C. Process definition.
- D. Process evaluation/analysis.
  1. Problem solving.
  2. Plan-Do-Check-Act/Standardize-Do-Check-Act.
- E. Process improvement.

III. Group Dynamic Skills--Team Building.

- A. Group dynamics and team building.
- B. KAIZEN.
- C. Organizational TQM structures.
- D. Policy deployment.
- E. Nominal group technique.
- F. Process evaluation/analysis.

IV. Off-Line Process.

A. Overview.
   1. Benefits (case studies).
   2. Key concepts.

B. System design.
   1. Customer needs/RQMTS determination.
   2. Simultaneous/concurrent engineering.
   3. Quality function deployment.

C. Parameter and tolerance design.
   1. Taguchi methods on quality engineering.
   2. Design of experiments.
   3. Quality (Taguchi) loss function.

D. Inventory control/product engineering.
   1. Bottleneck analysis.
   2. Group technology.
   3. Cellular-flex MFG/product technology.
   4. Quick changeover.
   5. Just-in-Time/KANBAN.
   6. Fault tree analysis, RFTA.
   7. "Pokayoke."

V. On-Line Process.

A. Overview.
   1. Benefits (case studies).
   2. Key concepts.
   3. Implementation process/guidelines.

B. Measurement engineering.
   1. Metrics and gaging.
   2. Measurement and sampling error.

C. Process control and improvement.
   1. Statistical process control.
   2. On-line Taguchi.
   3. Total productive maintenance.
   4. Designs of experiments.
   5. KAIZEN.
   6. Process evaluation and analysis.

VI. Acquisition Policy and Practices.

A. Contractor TQM evaluation.
B. Contractual implementation.
C. Customer-supplier interface.
D. Integration with other initiatives.

APPENDIX B

ONE-DAY SENIOR MANAGEMENT AWARENESS COURSE

APPENDIX B

ONE-DAY SENIOR MANAGEMENT AWARENESS COURSE

OVERVIEW

The first part of the one-day course will be directed toward defining the key concepts of TQM and their translation into DoD activities. These concepts include: quality, process, variation, and continuous improvement. Lecture, videotapes, and case studies are used. The content of instructional techniques should relate to the goals of the DoD TQM Master Plan.

Once quality awareness becomes a part of a senior manager's organizational philosophy, it is critical that awareness be transformed into actions within the workplace. Many of the senior managers have proven leadership skills. It would be their charge to use these skills to motivate, coach, and guide the work force toward the same level of quality awareness and toward appropriate behaviors. Therefore, the second aspect of the training should enhance team building and related skills, for example, problem solving, decision making, consensus building, and the development of action strategies (i.e.,"action-oriented skills").

It is important that the participants begin a process of planning that will take them well beyond the one day of training. In this respect, the final portion of the one-day course should be devoted to developing a TQM commitment toward specific actions from each of the senior managers.

OBJECTIVES

Overall Objective

Participants will understand the basic concepts of TQM and acquire an overview of the basic tools of analysis. Participants will also understand management's role and expected behaviors.

Specific Objectives

A. Participants will be given:

- A brief history and background that explain today's quality problems.
- Examples of TQM applications worldwide, in the U.S., and in DoD.
- The definition and scope of quality and an overview of TQM.
- The key management practices underlying the implementation of TQM.
- The importance of a process-oriented way of thinking.
- The necessity of long-term planning and commitment.

B. Participants will be able to use some basic guidelines on how to act as leaders during the implementation of TQM in their organization.

C. Participants will believe that:

- TQM can help them to improve work processes.
- TQM is the way to reduce costs and increase productivity.
- They have a key role in institutionalizing TQM.

- DoD can achieve a high standard of national defense for significantly less money than is currently being spent.

D. Participants will be willing to:

- Engage in further education and training about TQM and actively encourage their subordinates and colleagues to do so.
- Publicly recognize, encourage, and, where possible, support organizations in DoD and defense industry where strides are being made in implementing TQM.

CURRICULUM OUTLINE

A. What is meant by TQM?
   1. TQM history and background.
   2. Definitions and general explanation of basic principles:
      a. TQM.
      b. Quality.
      c. Process.
      d. Variation.
      e. Continuous improvement.
   3. Plan-Do-Check-Act (PDCA) cycle.

B. Management's role during TQM implementation.
   1. Commitment (public expression of actions they will take).
   2. Participation and involvement (model behavior).
   3. Resource support.

C. The importance of management behaviors to provide:
   1. Motivation.
   2. Leadership.
   3. Communication.
   4. Cross-functional teams.

D. Basic tools of analysis.

APPENDIX C

SIX-DAY GENERAL MANAGEMENT AWARENESS COURSE

APPENDIX C

SIX-DAY GENERAL MANAGEMENT AWARENESS COURSE

OVERVIEW

The six-day TQM course is designed to provide exposure to (1) quality awareness and TQM philosophy; (2) action-oriented skills (i.e., channeling that awareness into behaviors); (3) group development skills, essential in building trust and sharing ideas within the workplace; and (4) skills to overcome the institutional barriers to TQM implementation. The course can be modified to meet the diverse needs of the managers. This flexibility is an important feature of the six-day class.

This workshop is organized into two three-day sessions separated by a three-week "back at work" interval. The first three-day session is devoted to quality awareness, systems thinking, statistical thinking, the concept of process improvement, decision making, and interpersonal skills. Emphasis is placed on the development of effective communications and consensus building through the use of role playing and group participation exercises that focus on quality-related issues. Trainees will also be exposed to some of the action-oriented skills that will allow them, when they are back at work, to define processes that they are involved with, to suggest possible causes of variations, and to collect data. The "back at work" interval provides the setting where many of the concepts and methods acquired during the first three-day session are applied.

Upon return, the participants will be involved in (1) training in the additional statistical tools that aid in summarizing the data collected at the workplace, (2) learning of additional TQM concepts, and (3) learning how to recognize and overcome barriers they are likely to encounter.

The six-day workshop should also involve the participants in follow-up projects, such as developing objective measures of quality improvement, tying in to a TQM resource center, and networking workshop trainees.

OBJECTIVES

Overall Objective

Participants will understand the definitions and key concepts of TQM and the strategies for continuous improvement. Participants will also understand how to apply quantitative tools and procedures to process analysis and the basic concepts in data collection.

Specific Objectives

A. Participants will be given:

- The history and background leading to national quality-related problems in both the private and public sectors.
- The history of quality management.
- The definitions, key concepts, and principles of TQM.
- The definition and importance of management's role.

- The appropriateness of using quantitative methods and graphic tools for data collection and measurement.
- The basics of the statistical and measurement theory.

B. Participants will believe that TQM is a way to reduce the variation in the processes, an approach resulting in higher quality, reduction of costs, and increase in productivity.

C. Participants will be willing to:
- Engage in further education and training about TQM.
- Initiate specific TQM-related actions in their work activities.

CURRICULUM OUTLINE

A. Overview of the quality problem.
1. The real threat and challenge of foreign competition.
2. Quality of American products and services.
3. Examples of DoD quality problems.

B. History of quality and quality management worldwide and in the United States.
1. Post-WWII management philosophies and practices.
2. Management and workers' attitudes and relationships.
3. History of TQM in DoD.

C. TQM guiding principles concerning relationship of quality to productivity and cost.
1. Quality-productivity-cost relationship.

D. TQM key concepts.
1. Common causes and special causes.
2. Process variations.
3. Continuous improvement.

E. Strategies for process improvement (Plan-Do-Check-Act cycle).

F. Responsibilities of management in TQM implementation.
1. Team building and group facilitation.
2. Communication (breaking down barriers, reconciling the organizational structure with communication requirements).
3. Leadership (should be a "follow-me" approach, management must lead by example, be mentors, guides, and supporters).
4. Transforming organizational culture.

G. Understanding graphic tools.
1. Application of tools and procedures.

a. Pareto chart.
b. Cause-and-effect (fishbone) diagram.
c. Flow chart.
d. Run chart.
e. Histogram.
f. Scatter Diagram.
g. Control Chart.
h. Others.

2. Appropriateness of tools for special measurement situations.

H. Introduction to data collection.

1. Collection of meaningful data.
2. Qualitative and quantitative data.

I. Basic statistics.

1. Statistical theory.
2. Statistical thinking.
2. Statistical approach to continuous improvement.

J. Measurement.

1. Factors that affect measurement.
2 Outcome versus process measures.

APPENDIX D

EDUCATION OF SENIOR MANAGERS IN DoD

APPENDIX D

EDUCATION OF SENIOR MANAGERS IN DoD

This population is characterized by:

- Heterogeneity, representing a great variety of backgrounds and job experiences.
- Holding jobs that cover a wide span of responsibilities. These managers are often double- or triple-hatted and report to several superiors or constituencies.
- Holding jobs with significant time constraints:
  - Time demands fragmented.
  - Must be mission-ready at all times.
  - Continuous, multiple, and sometimes conflicting demands.
  - Lack of control over own time.
- Diversity of opinions of what constitutes good management practices.

In planning for the education of senior managers, consideration needs to be given to a population of executives who must be able to:

- Deal with rapid change.
- Continuously improve the systems and processes of their organizations.
- Be innovative (to meet current customer needs as well as anticipate future ones).
- Understand their role in influencing organizational culture.
- Engage in strategic planning, long-range thinking, and systemic thinking.
- Effectively coordinate the activities both within their own organization and with many other organizations.

APPENDIX E

ACQUISITION WORK FORCE FUNCTIONAL AREAS

APPENDIX E

ACQUISITION WORK FORCE FUNCTIONAL AREAS

The following list includes job categories typically found within the acquisition work force and should be considered in designing the TQM education and training program within the acquisition community of DoD:

- Program executive officers, program and project managers.
- Engineers and scientists.
- Procurement officers (PCOs, ACOs).
- Lab managers, administrative managers (i.e., comptrollers, finance officers, personnel, staff support).
- Contracting personnel (i.e., COs, auditors, contract negotiators).
- Supply procurement personnel.
- Logistics personnel.
- Quality assurance and quality control specialists.
- Industrial specialists.
- Property administrators.
- Manufacturing and production managers.

APPENDIX F

STUDENT LEARNING STYLES AND INSTRUCTIONAL METHODS

APPENDIX F

STUDENT LEARNING STYLES AND INSTRUCTIONAL METHODS

The premises of adult learning theory as applied to DoD managers should be considered prior to determining optimal learning styles. One tenet of adult learning theory is education versus re-education. Education involves teaching new knowledge, skills, and behaviors; re-education involves teaching new ones and changing or replacing old ones. Resistance to learning new information is common, particularly when it appears to contradict the old. Teaching new knowledge is easier than changing attitudes and behaviors. Adults, unlike children, already have preconceived ideas, as well as knowledge, skills, attitudes, and behaviors that are well-ingrained. Many of the management theories and practices of TQM are radically different from the traditional management practices used by DoD managers. The initial response may be resistance or rejection of the new information.

Adult learning theory also states that adult students are self-directed, bring a rich resource of experience to the situation, will only learn new information if it is perceived as relevant to their own needs, have an orientation to learning that is task- or problem-centered, and are primarily internally motivated. The theory also states that participative learning is more appropriate than non-participative for the development and administration of executive education (and that experiential learning often involves the re-formulation of action goals and plans).

A combination of approaches is recommended that includes experiential learning techniques, case studies, team development and group exercises, video tutorials, and the traditional lecture-seminar format with expert instructors.

APPENDIX G

CLASSROOM MATERIALS

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CLASSROOM MATERIALS

Reading materials should be distributed to students one to two-weeks prior to the beginning of the course. The readings should be based on the population. Readings should be limited to general overviews and an outline to give the students an idea of what the course will cover.

In-class handouts should include books or articles on the subject, workbooks or handouts that will be used in the course, and materials for future reading and reference. The selection of materials will vary with class composition. Course designers need to ensure consistency in the materials prepared for different groups. Materials will generally include: facilitation, case studies, orientation and overview, management and group dynamics, statistical process control, measurement and analysis, process analysis, problem solving and decision making, PDCA improvement cycle, and specific tools.

Other materials are usually handed out and described as "additional" recommended readings. A list of recommended books and articles should be included. Larger organizational entities may wish to establish a TQM library or resource center where materials are available for loan or purchase.

Materials for the instructors also need to be developed. These include instructor manuals and guides, workbooks, tests, and evaluation instruments. Development of the materials can either be done by the course developers or contracted out if the developers do not have the resources needed.

APPENDIX H

DoD CANDIDATE SCHOOLS AND INSTITUTIONS TO PROVIDE TQM EDUCATION AND TRAINING

APPENDIX H

DoD CANDIDATE SCHOOLS AND INSTITUTIONS TO PROVIDE ACQUISITION-RELATED TQM EDUCATION AND TRAINING

Air Force Institute of Technology, Wright-Patterson AFB, Dayton, OH
Air Training Command, Lowry AFB, Denver, CO
Air War College, Maxwell AFB, AL
Armed Forces Staff College,
Army Command and General Staff College, Ft. Leavenworth, KA
Army War College, Carlisle, PA
Defense Systems Management College, Fort Belvoir, VA
Extension Course Institute, Gunter AFB, AL
Industrial College of the Armed Forces, Washington, DC
Navy Acquisition Management Training Organization, Norfolk, VA
Naval Post Graduate School, Monterey, CA
Naval War College, Newport, RI
Systems Acquisition School, Air Force Systems Command (AFSC), Brooks AFB, TX
U.S. Air Force Academy, Colorado Springs, CO
U.S. Army Logistics Management College, Fort Lee, VA
U.S. Army Management Engineering Training Activity, Rock Island, IL
U.S. Military Academy, West Point, NY
U.S. Naval Academy, Annapolis, MD

There are also many training facilities for civilian and military executives, such as the Naval Aviation Executive Institute and the Naval Supply Corps School, that can provide TQM education.

A person at each of the listed schools was contacted by telephone. The schools differ with regard to their student population and teaching missions. All of these schools address acquisition in their curricula although emphasis and focus vary. Each contact was asked if the school was currently teaching TQM or some aspect thereof (e.g., SPC). Just over one-third were found to address TQM concepts in quality and reliability courses, in management courses, or throughout their curricula. Previous information collected indicates that the TQM focus is primarily statistical.

The contacts were also asked how they would prefer to integrate TQM into their curricula. All but two said they would prefer to take an outline or proposed course criteria and develop their own courses and materials so that they can tailor them to their student populations.

There should be some coordination among all schools. The QMBE&T can assist in this regard. Some of the schools will be able to provide a wide variety of TQM awareness, managerial, and technical courses, while others should specialize in training that is consistent with their mission goals.

APPENDIX I

INSTRUCTIONAL SYSTEMS DESIGN (ISD) APPROACH AND MODEL FOR TQM EDUCATION AND TRAINING STRATEGY

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INSTRUCTIONAL SYSTEMS DESIGN (ISD) APPROACH AND MODEL FOR TQM EDUCATION AND TRAINING STRATEGY

ISD APPROACH

1. Determine differences between the students' current skills, knowledges, and abilities and the desired ones.

2. Describe the relevant characteristics of the student population.

3. Develop the overall educational objectives, what is to be accomplished as a result of the instruction, taking into account that education is almost always necessary, but rarely sufficient, for behavioral change. This process must be paired with complementary actions.

4. Develop instructional objectives, in as explicit a form as possible, followed by development of learning objectives and learning steps required for mastery of those objectives. This, in essence, is a course outline.

5. Group learning objectives into categories and identify guidelines for optimum learning for each category.

6. Select media that takes into account the students' characteristics, the learning guidelines, the educational setting, and costs.

7. Develop and test instruction. Incorporate needed improvements.

8. Implement instruction. Perform internal and external evaluation. (Internal evaluation assesses whether the students learned what was intended during the course. External evaluation assesses whether the instruction had the desired effects on subsequent attitudes and behavior.)

9. Use evaluation data as feedback for continuous improvement.

The above process involves a great deal of work by persons skilled in the area of educational design and TQM. This is the general process that should be used in developing TQM courses to ensure a quality product. The following plan outlines a strategy of what needs to be done.

APPLICATION OF ISD APPROACH TO TQM EDUCATION AND TRAINING STRATEGY

Identify Training Resources and Requirements

The first step in designing a training plan is to determine resource requirements. These include:

Personnel: This resource includes training developers and training materials developers (manual writers, audio/visual media producers, and technical editors), students, instructors to pre-train the trainers, trainers and training evaluators, and administrators (for quota control, scheduling, logistics coordinating, site coordinating, and registration).

Materials: Training equipment includes tape recorders, video recorders, video cameras, overhead projectors, computer monitors, video players, interactive microcomputers, graphic aids, handbooks, manuals, texts, instructions, handouts, and policy/guidance statements.

Physical Sites: Location and facilities for training (schools, hotels, conference centers, etc.).

Identify Education and Training Strategies

The second step is to identify the education and training strategies. The terms "population" and "student" are interchangeable.

1. Identify the population to be trained (target student groups).

2. Conduct a needs assessment of each target group to identify training objectives.

3. Develop terminal learning objectives for each training group or program.

4. Develop curriculum outlines.

5. Determine adult student learning styles.

6. Develop instructional methodologies that consider adult learning styles.

7. Design and develop curriculum modules using methodologies that work best for the particular target group and subject matter.

   Examples of methodologies include: adult learning strategies, experiential learning techniques, individualized learning approaches, team development and group exercises, computer simulations, audio-visual and multi-media portable packages, programmed learning materials, computer-aided and computer-managed instruction, interactive video disk and videotape instruction, case study applications, video tutorials, mentor-guided on-the-job applications, learn-as-you-go prototype applications, role playing, and traditional lecture/seminar format.

8. Develop evaluation process and criteria.

9. Conduct prototype course (test, evaluate, modify).

Identify Delivery and Implementation Strategies

The third step is to identify delivery and implementation requirements. These include:

1. Minimum and maximum student in-class or instruction hours.

2. Number of instructor contact hours (if instructors will be used).

3. Pre- and post-course study or work requirements.

4. Course prerequisites, equivalencies, and waiver requirements.

5. Instructor requirements (criteria, selection, training, and evaluation methodologies). The instructor-trainer issues that need to be addressed include:

a. Instructor competencies required.
b. Ratio of internal trainers (management and training staff) to external trainers (professional trainers outside of organization--may be from DoD, other government agencies or contractors).

6. Potential instructor sources (contractors, industry experts, academic experts, DoD practitioners, DoD school experts).

7. Selection criteria for identifying individuals to be trained as instructors.

8. Instruction requirements. Questions to be addressed include:

a. How much in-class instructor time is needed?

b. Do we want full-time instructors or part-time? (If instructors are to be managers who are performing as instructors part-time, what part of their time is practical to request? Will funding for the "instructor" part of the job come from a special source?)

9. Optimal class size and student configuration (homogeneous or heterogeneous).

10. Location and facilities.

11. Evaluation methodology and process (internal and external).

12. Development of prototype courses (test, evaluate, and modify).

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